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# A FEASIBILITY STUDY IN MEASURING SOFT TISSUE ARTIFACTS ON THE UPPER LEG USING INERTIAL AND MAGNETIC SENSORS

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## ABSTRACT

Soft-tissue artifacts cause inaccurate estimates of body segment orientations. The inertial sensor (or optical marker) is orientating (or displacing) with respect to the bone it has to measure, due to muscle and skin movement [1].

In this pilot study 11 inertial and magnetic sensors (MTw, Xsens Technologies) were placed on the rectus femoris, vastus medialis and vastus lateralis (upper leg). One sensor was positioned on the tendon plate behind the quadriceps (iliotibial tract, as used in Xsens MVN [1]) and used as reference sensor. Walking, active and passive knee extensions and muscle contractions without flexion/extension were recorded using one subject. The orientation of each sensor with respect to the reference sensor was calculated. During walking, relative orientations of up to 28.6º were measured (22.4±3.6º). During muscle contractions without flexion/extension the largest relative orientations were measured on the rectus femoris (up to 11.1º) [2].

This pilot showed that the ambulatory measurement of deformation of the upper leg is feasible; however, improving the measurement technology is required. We therefore have designed a new inertial and magnetic sensor system containing smaller sensors, based on the design of an instrumented glove for the assessment of hand kinematics [3]. This new sensor system will then be used to investigate soft-tissue artifacts more accurately; in particular we will focus on in-use estimation and elimination of these artifacts.

## REFERENCES

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